



PRESENT LEVEL OF CONTAMINANTS IN THE ROMANIAN BLACK SEA SECTOR

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The development of industrial and agricultural activities, the intensification of riverine and maritime merchandise traffic in the Black Sea, as well as the population excess in its drainage basin determined the increase of pollution, with dramatic effects on the coastal zone of the marine ecosystem.

The Romanian littoral has been affected on the whole, beside erosion, by intense eutrophication of coastal waters, and - as a direct consequence - by a severe decline of biodiversity.

Four chemical (nutrients, heavy metals, radionuclides, hydrocarbons) and one biological (fungi) indicators are being reviewed for their present levels and evolutionary trends.

Results on the present state of the marine environment in the Romanian Black Sea sector obtained by the Romanian Marine Research Institute (RMRI) belong to the integrated monitoring network of Romania and are being used within the monitoring network of the GEF Black Sea Environmental Programme.

In the Romanian Black Sea shelf waters the dissolved inorganic **nitrogen** increased by a factor of four to five, and the **phosphorus** load increased more than two times compared to 1970. At the same time the Danube's silica discharge reduced strongly, its annual discharge for the last 15 years being less than a half the estimated input before 1970. This is related to the decrease of the solid river discharge, as a consequence of the damming works for energy production and of intense consumption during the previous massive diatom blooms as well.

Considering the interannual changes of the nutrient stocks discharged by the Danube into the sea, a slight but continuous diminishing tendency should be noticed after 1990.

High **heavy metal** concentration in sediments originating in the southern zone of the Romanian littoral, including the Constantza harbour, are mainly due to land-based pollution sources (point sources, wastewater treatment plants, harbour activities).

Blue mussels (*Mytilus galloprovincialis*) show higher heavy metal levels than analyzed fish samples (*Gobius melanostomus*, *Engraulis encrasicolus ponticus*, *Sprattus sprattus phalericus*).

The content of heavy metals in marine biota originates in evident anthropic influences along the Romanian littoral.

The **Sr-90** content in marine biota is low (maximum 1 Bq Kg⁻¹ fresh weight). The relatively highest **Cs-137** values are found in submerged sediments (maxima up to about 200 Bq Kg⁻¹ dry). Cs-137 in biota reaches contents up to several Bq Kg⁻¹ f.w. according to their biology.

The assessment of the radiometric quality of abiotic and biotic components is useful with respect to the knowledge of the state of the marine environment under anthropic impact as well as to the use of its mineral and living resources.

The **oil** pollution reveals different aspects of the evolution of this process in relation with the received anthropic input in various investigated areas.

In the Danube river mouth marine area the average seawater hydrocarbon concentration of 170.3 µg l⁻¹ is 42% higher than that found for the southern littoral at 10m depth.

The consequence of anthropic effects exercised by hydrocarbon exploitation, transportation and processing activities explains the higher level of sea water contamination by this pollutant in drilling areas, in direct discharge areas of industrial and domestic sewage waters and in the Constanta harbor.

The amplification of **fungi** pollution, especially due to the representatives of *Cryptococcaceae* family, is being confirmed.

Most of the up to 60% isolated forms of *Rhodotorula* from the analyzed samples are pathogenic, followed by species of *Candida*, *Cladosporium* and *Penicillium*.

Quantitatively, considerable seasonal differences resulted in the specific composition of mycoplancton, spring-summer forms mostly belonging to the genera *Trichoderma* and *Epicoccum*.

Typical pollution indicators belonging to the genera *Cryptococcus*, *Rhodotorula* and *Mucor* were more difficultly attributable to a certain season or another.

The mean density value of living fungi spores increased continuously, showing a growing tendency of littoral water contamination.

Even the offshore reference point Tuzla (10 nautical miles) indicated considerable values, comparable to shallow waters, frequently exceeding 1,000 propagules l⁻¹.

These data support the environment protection measures foreseen by the Ministry of Waters, Forests and Environmental Protection, the requests of the Danube Delta Biosphere Reserve Administration for its concrete research and management needs, the implementation of the Black Sea Strategic Action Plan and the fulfillment of Romania's obligations in the framework of the Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention, 1992) and of the Odessa Ministerial Declaration (1993).